

What is claimed is:

1. (currently amended) An acetabular impactor (10, 10', 10'') for aiding a surgeon in controlling the installation of a hip prosthesis (11), the impactor comprising:
 - (a) an impactor head (20);
 - (b) a housing (12, 12', 12'') attached to the impactor head, the housing having at least one bend permitting the housing to avoid anatomical structures or tissue during use in surgery and enclosing a drive train (14, 14', 14'') having, at a far end (134), a prosthesis engaging thread (124), and at the opposite end (42'), a handle (20, 20', 20'') which facilitates turning of the drive train by the operator; and
 - (c) a locking mechanism (44, 50, 52, 54, 56, 60, 62, 67, 68; 124, 130, 142, 146; 180, 193, 194, 195, 196, 200, 202, 206, 210, 212, 14) associated with the housing which selectively locks the drive train; and thus the prosthesis, in position,wherein further the opposite end (42') of the drive train has a latch device (52, 54, 56, 60, 62; 44, 50, 180) which enables quick removal from the housing for cleaning and sterilization.
2. (currently amended) The acetabular impactor (10, 10', 10''), wherein the drive train (14, 14', 14'') includes at least one u-joint (30') located so as to transmit torque through at a bend in the housing (12, 12', 12'').
3. (original) The acetabular impactor (10, 10', 10'') of claim 1, wherein the housing (12, 12', 12'') is C-shaped.
4. (original) The acetabular impactor (10) of claim 1, wherein the locking mechanism (44, 50, 52, 54, 56, 60, 62, 67, 68) comprises a drive train (14) having a threaded, prosthesis engaging tip (146a), the drive train further including a lever link (42) which is disposed in the housing (12) so as to rotate on a fulcrum (32), such that, actuation of the lever link draws the threaded tip (146a) into the housing and, when connected to a prosthesis (11), draws the prosthesis against an impaction surface (140a), wherein sufficient friction may be generated therebetween to lock the prosthesis in place.
5. (original) The acetabular impactor (10) of claim 4, wherein the link lever (42) has a knob (20) attached to its extreme end, the knob enabling a user to orient the tip (146a).

6. (original) The acetabular impactor (10) of any one of claims 1-5, wherein a lockable, variable length link (56) is attached between the link lever (42) and the housing (12) in order to permit a user to vary pressure that the tip can exert against the impaction head (140).
7. (original) The acetabular impactor (10) of claim 6, wherein the variable link (56) is infinitely variable and unlockable via a latch (68) in order to permit release of pressure on the prosthesis (11).
8. (original) The acetabular impactor (10) of claim 7, wherein the prosthesis engaging tip (146a) is connected by way of a first U-joint (30') to a lever (32) which slides in a pivoting sleeve (34) fixed to the housing via a first pivot (36).
9. (original) The acetabular impactor (10) of claim 1, wherein a one-way catch mechanism (67) prevents a rod (56) connected to the second lever (42) from sliding out of the housing (12) unless an unlock lever (68) is activated.
10. (original) The acetabular impactor (10, 10', 10'') of claim 1, wherein the impactor head (20) is covered by an impactor head covering (140), made of a shock-absorbing material, in order to absorb the impact stresses incurred during use of the impactor.
11. (original) An acetabular impactor (10') of claim 1, wherein the locking mechanism (124, 130, 142, 146) is an expandable collet (120) which a knob (20'), adjacent the handle (60), expands when turned in one direction so as to lock the collet (120) against a surface of a prosthesis (11) in order to prevent the prosthesis from rotation, thus enabling the surgeon to pre-set and lock the position of the prosthesis prior to the installation thereof.
12. (original) The impactor (10') of claim 11, wherein the collet (120) is comprised of two jaws (124) having opposite ends (125, 126) pivoting on a fulcrum (32), one end of which being adapted to engage an interior surface of a prosthesis (11), the prosthesis engaging ends being drawn away from one another when an actuator piston (146), which passes through the fulcrum (130), is drawn therebetween, thereby eliminating the need of threading the acetabular prosthesis (11) onto the tip (125) of the impactor as the prosthesis can simply be placed over the collet and the collet expanded so as to grip the internal threads (122) of the prosthesis.

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13. (original) The impactor (10') of claim 12, wherein the fulcrum (32) is mounted in a cage (142) through which the actuator piston (146) passes, the actuator piston having a shoulder (145) bearing against a surface (142') of the cage opposite the prosthesis engaging ends (125) of the jaws (124), such that, as the actuator piston is being activated to separate the prosthesis engaging ends of the jaws, a shoulder (146e) of the piston contacting the surface compresses the jaws into the cage, thereby drawing the jaws into the impactor and, when connected to a prosthesis, thereby drawing the prosthesis against an impaction surface (140a) so as to firmly fix the prosthesis against the impaction surface.

14. (original) The impactor (10') of claim 13, wherein the collet (120) is provided with external, three-dimensional structures (124) which engage with corresponding structures (122) on the prosthesis (11).

15. (original) The impactor (10') of claim 14, wherein the three dimensional structures are threads (122).

16. (original) The impactor (10') of claim 14, wherein the three-dimensional structures are grooves.

17. (original) The impactor (10') of claim 14, wherein the three-dimensional structures are divots.

18. (currently amended) The acetabular impactor (10') of claim 11, wherein the drive train (14) includes at least one u-joint (30') located so as to transmit torque through ~~at~~ a bend in the housing (12').

19. (original) The acetabular impactor (10') of claim 11, wherein the housing (12') is C-shaped.

20. (original) The acetabular impactor (10') of claim 1, wherein further, the locking mechanism (180, 193, 194, 195, 196, 200, 202, 206, 210, 212) is made up of a latch housing (180) which is constrainable against rotation while being urged part-way into a recess (184) toward the engagement end (186) of an impactor head (140) by a spring (190) captured between the latch housing (180) and a shaft (212) of the drive train, the spring urging the latch housing against a cam stop (194) when a trigger (196, 200) is positioned so as to selectively:

i) enable the drive train to be turnable within the housing (12'') by the operator rotating the handle (160), the cam stop (194) being connected to a shaft (200) to which an actuator component (196) is attached,

ii) enable a user to turn the cam stop (194) in a position to block further movement of the latch housing (180) into the recess (184), such that when the cam stop is turned so that it does not block further entry of the latch housing into the recess (184), catches (206) inside the latch housing are urged into engagement with serrations (210) cut into the outer circumference of a component (212) of the drive train, wherein the engagement of the catches (206) into the serrations (210) constrains the latch housing (190) against rotational movement and locks the drive train (14'') against rotational movement,

the selectivity enabling the surgeon to pre-set and lock the position of the prosthesis (11) prior to the installation thereof, wherein the latch housing (180) may be unlatched from the housing so as to enable quick and invention is easily cleanable.

21. (original) The acetabular impactor (10'') of claim 1, wherein the housing (12'') is C-shaped, in order to minimize the invasiveness of the surgery by better clearing anatomical structures and tissue.

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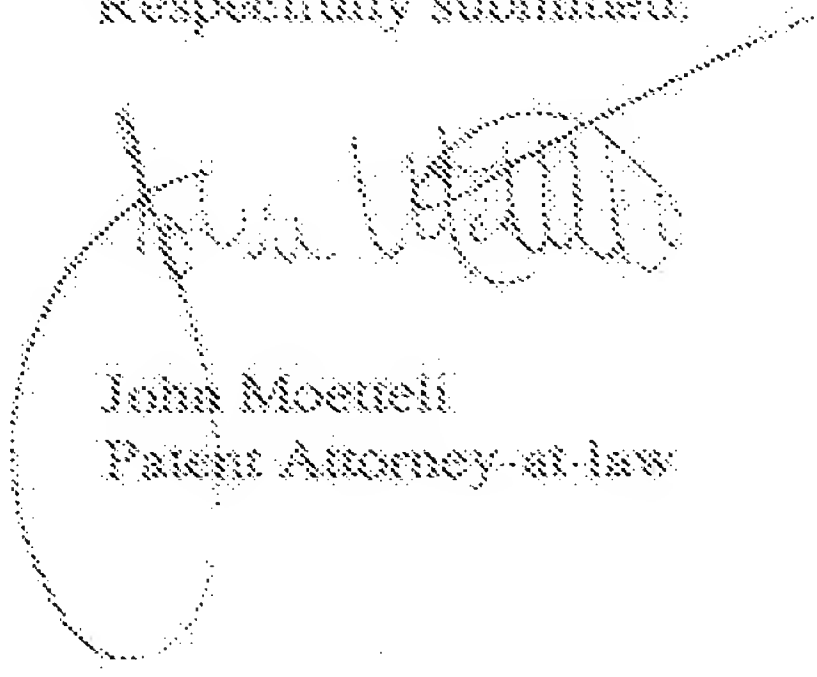
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Further, Applicant provides replacement sheets 10-13.

We trust that all is in order.

If the Examiner has questions, he is invited to contact the Undersigned by phone at 01141 71 230 1000 or fax at 01141 71 230 1001, or by email to moetteli@email.com. If further fees are due for this amendment, the Office is authorized to debit the deposit account of Moetteli & Associates SARL, No. 42794.

Respectfully submitted,



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Encls: mentioned replacement sheets 10-13

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What is claimed is:

1. An acetabular impactor (10, 10', 10'') for aiding a surgeon in controlling the installation of a hip prosthesis (11), the impactor comprising:

- (a) an impactor head (20);
- (b) a housing (12, 12', 12'') attached to the impactor head, the housing having at least one bend permitting the housing to avoid anatomical structures or tissue during use in surgery and enclosing a drive train (14, 14', 14'') having, at a far end (134), a prosthesis engaging thread (124), and at the opposite end (42'), a handle (20, 20', 20'') which facilitates turning of the drive train by the operator; and
- (c) a locking mechanism (44, 50, 52, 54, 56, 60, 62, 67, 68; 124, 130, 142, 146; 180, 193, 194, 195, 196, 200, 202, 206, 210, 212, 14) associated with the housing which selectively locks the drive train, and thus the prosthesis, in position,

wherein further the opposite end (42') of the drive train has a latch device (52, 54, 56, 60, 62; 44, 50; 180) which enables quick removal from the housing for cleaning and sterilization.

4. The acetabular impactor (10, 10', 10''), wherein the drive train (14, 14', 14'') includes at least one u-joint (30') located so as to transmit torque through ~~at~~ a bend in the housing (12, 12', 12'').

5. The acetabular impactor (10, 10', 10'') of claim 1, wherein the housing (12, 12', 12'') is C-shaped.

4. The acetabular impactor (10) of claim 1, wherein the locking mechanism (44, 50, 52, 54, 56, 60, 62, 67, 68) comprises a drive train (14) having a threaded, prosthesis engaging tip (146a), the drive train further including a lever link (42) which is disposed in the housing (12) so as to rotate on a fulcrum (32), such that, actuation of the lever link draws the threaded tip (146a) into the housing and, when connected to a prosthesis (11), draws the prosthesis against an impaction surface (140a), wherein sufficient friction may be generated therebetween to lock the prosthesis in place.

5. The acetabular impactor (10) of claim 4, wherein the link lever (42) has a knob (20) attached to its extreme end, the knob enabling a user to orient the tip (146a).

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6. The acetabular impactor (10) of any one of claims 1-5, wherein a lockable, variable length link (56) is attached between the link lever (42) and the housing (12) in order to permit a user to vary pressure that the tip can exert against the impaction head (140).
7. The acetabular impactor (10) of claim 6, wherein the variable link (56) is infinitely variable and unlockable via a latch (68) in order to permit release of pressure on the prosthesis (11).
8. The acetabular impactor (10) of claim 7, wherein the prosthesis engaging tip (146a) is connected by way of a first U-joint (30') to a lever (32) which slides in a pivoting sleeve (34) fixed to the housing via a first pivot (36).
9. The acetabular impactor (10) of claim 1, wherein a one-way catch mechanism (67) prevents a rod (56) connected to the second lever (42) from sliding out of the housing (12) unless an unlock lever (68) is activated.
10. The acetabular impactor (10, 10', 10'') of claim 1, wherein the impactor head (20) is covered by an impactor head covering (140), made of a shock-absorbing material, in order to absorb the impact stresses incurred during use of the impactor.
11. An acetabular impactor (10') of claim 1, wherein the locking mechanism (124, 130, 142, 146) is an expandable collet (120) which a knob (20'), adjacent the handle (60), expands when turned in one direction so as to lock the collet (120) against a surface of a prosthesis (11) in order to prevent the prosthesis from rotation, thus enabling the surgeon to pre-set and lock the position of the prosthesis prior to the installation thereof.
12. The impactor (10') of claim 11, wherein the collet (120) is comprised of two jaws (124) having opposite ends (125, 126) pivoting on a fulcrum (32), one end of which being adapted to engage an interior surface of a prosthesis (11), the prosthesis engaging ends being drawn away from one another when a actuator piston (146), which passes through the fulcrum (130), is draw therebetween, thereby eliminating the need of threading the acetabular prosthesis (11) onto the tip (125) of the impactor as the prosthesis can simply be placed over the collet and the collet expanded so as to grip the internal threads (122) of the prosthesis.

13. The impactor (10') of claim 12, wherein the fulcrum (32) is mounted in a cage (142) through which the actuator piston (145) passes, the actuator piston having a shoulder (145) bearing against a surface (142') of the cage opposite the prosthesis engaging ends (125) of the jaws (123), such that, as the actuator piston is being activated to separate the prosthesis engaging ends of the jaws, a shoulder (146e) of the piston contacting the surface compresses the jaws into the cage, thereby drawing the jaws into the impactor and, when connected to a prosthesis, thereby drawing the prosthesis against an impaction surface (140a) so as to firmly fix the prosthesis against the impaction surface.

14. The impactor (10') of claim 13, wherein the collet (120) is provided with external, three-dimensional structures (124) which engage with corresponding structures (122) on the prosthesis (11).

15. The impactor (10') of claim 14, wherein the three dimensional structures are threads (122).

16. The impactor (10') of claim 14, wherein the three-dimensional structures are grooves.

17. The impactor (10') of claim 14, wherein the three-dimensional structures are divots.

18. The acetabular impactor (10') of claim 11, wherein the drive train (14') includes at least one u-joint (30') located so as to transmit torque through ~~as~~ a bend in the housing (12').

19. The acetabular impactor (10') of claim 11, wherein the housing (12') is C-shaped.

20. The acetabular impactor (10') of claim 1, wherein further, the locking mechanism (180, 193, 194, 195, 196, 200, 202, 206, 210, 212) is made up of a latch housing (180) which is constrainable against rotation while being urged part-way into a recess (184) toward the engagement end (186) of an impactor head (140) by a spring (190) captured between the latch housing (180) and a shaft (212) of the drive train, the spring urging the latch housing against a cam stop (194) when a trigger (196, 200) is positioned so as to selectively:

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i) enable the drive train to be turnable within the housing (12'') by the operator rotating the handle (160), the cam stop (194) being connected to a shaft (200) to which an actuator component (196) is attached,

ii) enable a user to turn the cam stop (194) in a position to block further movement of the latch housing (180) into the recess (184), such that when the cam stop is turned so that it does not block further entry of the latch housing into the recess (184), catches (206) inside the latch housing are urged into engagement with serrations (210) cut into the outer circumference of a component (212) of the drive train, wherein the engagement of the catches (206) into the serrations (210) constrains the latch housing (180) against rotational movement and locks the drive train (14'') against rotational movement,

the selectivity enabling the surgeon to pre-set and lock the position of the prosthesis (11) prior to the installation thereof, wherein the latch housing (180) may be unlatched from the housing so as to enable quick and invention is easily cleanable.

21. The acetabular impactor (10'') of claim 1, wherein the housing (12'') is C-shaped, in order to minimize the invasiveness of the surgery by better clearing anatomical structures and tissue.

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